RESPONSE TO COMMENTS

Red Dog Mine Permit Modification (AK 003862-5)

The public comment period for the draft modified permit for the Red Dog Mine facility began on March 31, 2003, and expired on May 14, 2003. Comments received include letters from Earthjustice on behalf of Northern Alaska Environmental Center, Southeast Alaska Conservation Council, Alaskans for Responsible Mining, Alaska Community Action on Toxics, and Mineral Policy Center; Center for Science and Public Participation; Center on Race Poverty and the Environment on behalf of the Kivalina Relocation Planning Committee and the Kivalina IRA Council; NANA Regional Corporation, Inc.; Teck Cominco Alaska Inc.; and the Alaska Miners Association, Inc.

The following is a summary of the comments and EPA's responses (if the same or similar comments were received from several commenters the comment is only addressed once):

Comments from Earthjustice

Comment 1: The report entitled *Salmon as a Bioassay Model for TDS* (Alaska Science and Technology Foundation, Stekoll, et al., 2003, hereafter referred to as the ASTF study) concluded that total dissolved solids (TDS) concentrations of 250 ppm resulted in significantly lower fertilization rates, and elevated TDS concentrations resulted in higher mortality during the week after hatching. The study only measured effects on fertilization at concentrations as low as 250 ppm, and it is possible that similar effects could result from lower TDS concentrations. The study documents negative impacts at concentrations below those proposed in the NPDES permit modification. The proposed permit allows the facility to discharge up to 500 ppm TDS in the Ikalukrok during times when Dolly Varden, and chum, chinook (king), and sockeye salmon may spawn in the stream. Moreover, the proposed NPDES permit would include a mixing zone 3,420 feet long in Ikalukrok Creek in which TDS levels will exceed 500 ppm.

Response: The State of Alaska certified, under section 401 of the Clean Water Act, that the permit modification complies with the state water quality standards. The applicable TDS criterion is 500 mg/L where spawning activity occurs, and is the basis of the permit limits. The mixing zone was specified in the state certification, pursuant to state water quality standards. While TDS concentrations within the mixing zone exceed 500 mg/L, there is no spawning within the mixing zone, according to the Alaska Department of Fish and Game (memo from Alaska

Department of Fish and Game to Pete McGee, Alaska Department of Environmental Conservation, dated July 27, 2002).

The ASTF study did several different assays. The most sensitive assay (i.e., the continuous exposure assay) showed that fish eggs fertilized in TDS solution for 2 minutes, rinsed, and then transferred to the same concentration of TDS solution for the remainder of the assay showed, in some cases, reduced fertilization success at low TDS concentrations. The results of the assay were as follows:

- king, coho, and pink salmon exhibited adverse effects at 250 mg/L TDS (no adverse effects were observed at 0 mg/L) .
- chum and steelhead salmon exhibited adverse effects at 750 mg/L TDS (no adverse effects were observed at 500 mg/L).
- Arctic char exhibited adverse effects at 1875 mg/L TDS (no adverse effects were observed at 1250 mg/L).

The Alaska Department of Fish and Game (memo from Alaska Department of Fish and Game to Pete McGee, Alaska Department of Environmental Conservation, dated July 27, 2002) identified only three species – king salmon, Dolly Varden and chum salmon – as active spawners in Ikalukrok Creek, however, none of these fish spawn within the authorized mixing zone. There has been only one reported observation of eight sockeye salmon; that observation was made in August 1997, in the lower portion of Ikalukrok Creek. There have been no reports of spawning sockeye, however, so the study is not relevant to this species. The following addresses each of the three species known to spawn in the Ikalukrok Creek:

Chum Salmon

Chum salmon spawn in Ikalukrok Creek below Station 160 (located in Ikalukrok Creek about 3 miles below the confluence of Dudd Creek). The permit modification requires monitoring at Station 160 to ensure that the TDS level does not exceed 500 mg/L in spawning areas during spawning periods. The ASTF study tested chum salmon and found that spawning chum are not adversely affected by TDS at 500 mg/L.

Dolly Varden

The ASTF study did not test Dolly Varden and it is not clear how sensitive this species is to TDS. Dolly Varden spawn in Ikalukrok Creek below Station 160,[1] and all age groups are routinely observed in Ikalukrok Creek. Juvenile Dolly Varden populations in Ikalukrok Creek ranged from a low of 79 in 2001 to a high of 945 in 1999. While populations fluctuated, there was no discernable upward or downward trend in the juvenile Dolly Varden populations from 1997 to 2003. Field observations of Dolly Varden in waterbodies impacted by the mine's effluent (Ikalukrok Creek below the confluence of Main Stem Red Dog Creek, Ikalukrok Creek below the confluence of Dudd Creek, and Ikalukrok Creek below the confluence of the Wulik River) and those not impacted by the mine's effluent (Dudd Creek, Evaingiknuk Creek, Anxiety Ridge Creek, and Ikalukrok Creek above the confluence of Main Stem Red Dog Creek), demonstrate that population cycles are similar in the affected and unaffected area, with no correlation between numbers of Dolly Varden and the presence or absence of mine effluent. Therefore, the weight of evidence suggests that the modified permit condition allowing 500 mg/L TDS during spawning will not adversely impact the Dolly Varden populations in waters impacted by the Red Dog Mine's effluent.

King (Chinook) Salmon

King salmon are sparsely represented in Ikalukrok Creek with only one reported observation of a single pair spawning in the Ikalukrok Creek in 2001, and no juvenile king salmon collected in sampling nets between 1990 and 2003. The Alaska Department of Environmental Conservation (DEC) reports that the king salmon population in the Red Dog Creek watershed does not represent a significant breeding population. While the ASTF study reported a reduction in fertilization success for king salmon at a TDS concentration of 250 mg/L, it also reported that at least one test concentration greater than 250 mg/L was not significantly different from the control. Due to the uncertainty of the ASTF study results for king salmon, and the lack of an observed breeding population residing in the waters impacted by Red Dog Mine's effluent, the requirements in the modified permit will not adversely impact the king salmon population.

Conclusion

[1]There is some Dolly Varden spawning habitat in Ikalukrok Creek at the mouth of Dudd Creek. Teck Cominco collected TDS samples at several transects across Ikalukrok Creek, at the mouth of Dudd Creek, as well as vertical profiles of the water. Results from the monitoring show that this spawning habitat is composed primarily of Dudd Creek water with little input from Ikalukrok Creek, and the TDS level reflects the water quality in Dudd Creek without the influence of the effluent.

The NPDES regulations at 40 C.F.R. 122.44 (d) require water quality based effluent limits in NPDES permits to be based on the State's approved water quality criteria. The applicable water quality criterion in Ikalukrok Creek is 500 mg/L, and the effluent limits must be based on this criterion. However, the ASTF study provides evidence that TDS that is similar in composition to the Red Dog Mine's effluent, has impacts on fertilization success in salmonids. It also demonstrates that these effects vary widely from species to species, and it is not possible to extrapolate the results of one species to another. Some tested salmonid species are affected at concentrations that this permit modification will allow, but those species are not present in waters affected by the effluent. Other tested species are not affected at concentrations that the modified permit will allow. Some species present, notably Dolly Varden and Arctic grayling, were not tested. Therefore, EPA has sent a 308 Information Request to Teck Cominco that requires them to conduct tests, similar to those conducted in the ASTF study, to determine the TDS level that will be protective of Dolly Varden, and Arctic grayling spawning. The results from these tests will be used to determine if a more stringent effluent limit is required when the permit is reissued.

Comment 2: The proposed NPDES permit does not allow the facility to discharge effluent until Arctic grayling have finished spawning. However, in the draft 401 certification of the NPDES permit the DEC suggested that this requirement be removed and that the facility be allowed to discharge during Arctic grayling spawning provided the TDS concentration at the edge of the mixing zone in Main Stem Red Dog Creek is maintained below 500 ppm. DEC provided two charts in support of its request.

For the reasons stated in Comment number 1, such a change has the potential to cause significant adverse impacts to the Arctic grayling in Red Dog Creek and should not be allowed. Moreover, the 401 certification should be used to impose more stringent restrictions on a discharge permit; it should not be used to remove or loosen restrictions that are already in place in the draft permit.

Response: The final 401 certification allows the facility to discharge during Arctic grayling spawning and the final permit modification reflects this. The final permit modification also includes monitoring at the edge of the mixing zone to ensure that the instream criterion of 500 mg/L is not exceeded outside of the authorized mixing zone (the mixing zone in Main Stem Red Dog Creek begins at the confluence of North Fork Red Dog Creek and the Main Stem and continues downstream for 1,930 feet).

The regulations governing state certification (40 C.F.R. §124.53) allow for the State to stipulate less stringent conditions in the permit, provided the certification includes statements of the extent to which each condition of the permit can be made less stringent without violating the requirements of state law. The State's certification states that allowing TDS levels of 500 mg/L during Arctic grayling spawning complies with the newly adopted site-specific criteria for Main Stem Red Dog Creek (i.e., 1500 mg/L TDS when Arctic grayling are not spawning, and 500 mg/L TDS when Arctic grayling are spawning) as well as the existing state-wide water quality criteria for aquatic life (500 mg/L TDS).

The ASTF study did not specifically test Arctic grayling, but of the six species that were tested, three were not affected by TDS levels of 500 mg/L. Therefore, the study is inconclusive as to whether Arctic grayling are sensitive to that level of TDS. A literature review yielded no studies that compare the sensitivities of Arctic grayling to those species tested in the ASTF study. Arctic grayling spawn in Main Stem Red Dog Creek and North Fork Red Dog Creek, with the majority of spawning occurring in North Fork Red Dog Creek. Spawning has been known to occur in Main Stem Red Dog Creek when breakup occurs later in the year and water temperatures remain colder later in North Fork Red Dog Creek. Field sampling results for Arctic grayling in the Red Dog Creek watershed indicate that populations have fluctuated between 1993 and 2000, from a low of 19 in 1998 to a high of 359 in 2000, without any discernable upward or downward trend. All age groups from young of the year to adults are routinely observed in the Main Stem Red Dog Creek. The data available to compare populations of Arctic grayling in waters impacted by the mine's effluent (Main Stem Red Dog Creek) and those not impacted by the mine's effluent (North Fork Red Dog Creek), indicate that there is no substantial difference between the population fluctuations in impacted and non-impacted waterbodies. Therefore, the weight of evidence suggests that allowing TDS concentrations of 500 mg/L (the existing water quality standard) at the end of the mixing zone will not adversely impact the Arctic grayling populations in the Red Dog Creek watershed.

However, as stated previously, the ASTF study provides evidence that TDS has impacts on fertilization success in some salmonids, therefore, to provide additional data on the relevant species, EPA has sent a 308 Information Request to Teck Cominco that requires them to conduct tests, similar to those conducted in the ASTF study, to determine the TDS level that will be protective of Arctic

grayling spawning. If warranted by the results from these tests, more stringent effluent limits may be imposed when the permit is reissued.

Comment 3: EPA cannot modify the proposed NPDES permit to make it less restrictive without conducting another environmental assessment and reopening the public comment period.

Response: The final permit modification has been revised to allow the facility to discharge during Arctic grayling spawning. EPA is relying on the State's certification, which states that allowing TDS levels of 500 mg/L during Arctic grayling spawning complies with the newly adopted site-specific criterion for Main Stem Red Dog Creek (i.e., 500 mg/L when Arctic grayling are spawning) as well as the existing state-wide water quality standard (i.e., 500 mg/L). EPA is not reopening the comment period because this change is responsive to a comment received (see Comment #24), is consistent with the existing State standards and the State certification (both of which were subject to public notice and comment), and is not significant enough to render the public notice of the draft permit modification inadequate. See Responses to Comments #2 and #24 for additional information.

Comment 4: The State's aquatic life criterion permits TDS levels of 500 ppm in all waters and concentrations up to 1000 ppm if DEC determines that the elevated levels are not reasonably expected "to cause an adverse effect to aquatic life." The ASTF study demonstrates that this criterion is insufficient to protect spawning fish. While the 500 ppm limit during spawning in Ikalukrok Creek may satisfy the letter of the current State water quality standard, it does not reflect more recent scientific developments or the acknowledgment that the standard may not be sufficiently protective.

Response: See response to Comment #1.

Comment 5: EPA and DEC appear intent on changing the state water quality criteria and permit to allow Teck Cominco to maintain its current discharges rather than accepting the new science from the ASTF study and modifying the permit in a way that would acknowledge the new study. EPA should not accept the State certification under these conditions and, instead, should deny the permit modification (see 40 C.F.R. 122.4(a), (d)). Alternatively, EPA should impose an additional requirement in the proposed modified NPDES permit prohibiting

discharges to Ikalukrok Creek during fish spawning (see 33 U.S.C. § 1342(a)(1), (2)).

Response: DEC has revised the TDS water quality criteria in Main Stem Red Dog Creek only. These site-specific criteria are allowed by federal regulation (40 § C.F.R. 131.11(b)(1)(ii)) as long as they protect the designated uses of the waterbody and are scientifically defensible. EPA has reviewed and approved the site-specific criterion of 1500 mg/L that is applicable after Arctic grayling spawning is complete.

EPA has not taken action on the site-specific criterion of 500 mg/L during the Arctic grayling spawning period, in view of the ASTF study. That study tested six salmonid species. Three species showed effects on spawning efficiency at 500 mg/l, and three showed no effects at that concentration. However, the study did not specifically test either Arctic grayling (which spawn in Main Stem Red Dog Creek) or Dolly Varden (which spawn in Ikalukrok Creek), so the study is inconclusive as to the sensitivity of these species to TDS. Based on field information it appears that there is successful recruitment of Arctic grayling and Dolly Varden when TDS levels are at 500 mg/L during spawning. See Response to Comment #1 for additional discussion.

However, EPA is requiring Teck Cominco to conduct tests, similar to those conducted in the ASTF study, to determine the TDS level that will be protective of Dolly Varden and Arctic grayling spawning. If warranted by the results of these tests, a different effluent limit may be imposed when the permit is reissued. In the interim, the final modified permit allows the facility to discharge during Arctic grayling spawning and Dolly Varden/chum salmon spawning provided the in-stream TDS concentration does not exceed 500 mg/L, in accordance with the existing applicable water quality criteria.

Comment 6: EPA should reject the proposed modification because the process by which it has been considered by EPA and DEC demonstrates a disregard for the procedures required by the Clean Water Act (CWA) regulations and has not provided adequate opportunity for public comment. In order to modify the NPDES permit before it expires, EPA and DEC have embarked on a rushed, overlapping effort to push though changes to the state water quality criteria and NPDES permit.

Response: The NPDES regulations require a minimum of 30 days for public comment on the permit modification (40 § C.F.R. 124.10(b)). The draft NPDES permit was public noticed with a 45 day comment period. Although the State had not adopted its site-specific criterion for TDS prior to the public notice for the draft NPDES permit modification, the accompanying Fact Sheet acknowledged that a final action would not be taken on the permit modification unless the site-specific criterion was finalized and the 401 certification for the permit was received. The National Environmental Policy Act (NEPA) regulations state that an action cannot be taken on a Finding of No Significant Impact (FONSI) for a minimum of 30 days after its release (40 C.F.R. § 6.400). The FONSI was released more than 90 days prior to the issuance of the permit modification.

Comment 7: DEC public noticed the proposed site-specific criteria per Teck Cominco's request, on November 22, 2002. The comment period ended January 10, 2003, and DEC has not responded to the public comments or officially submitted the proposed change to EPA for approval. The Fact Sheet stated that EPA can modify an existing permit when "the standards or regulations on which the permit was based have been changed." Pursuant to the regulation, however, the permit may be modified only if EPA "has approved a State action with regard to a water quality standard," and the "permittee requests modification...within ninety (90) days after Federal Register notice of the action on which the request is based." In this case, there has been no Federal Register notice because EPA has yet to take the action upon which the modification will be based. Nor has the state approved the site-specific criteria or submitted it to EPA for approval.

Response: The Fact Sheet for the draft modified permit acknowledged that the permit modification would not be finalized unless the site-specific criterion was formally adopted by DEC and approved by EPA. EPA is required to publish new site-specific criteria in the Federal Register only if EPA promulgates the site-specific criteria for the State of Alaska. In this case, EPA is not promulgating the site-specific criteria, but rather is approving/disapproving DEC's adoption of the site-specific criteria into its water quality standards regulations. EPA approval/disapproval of state water quality standards is not required to be published in the Federal Register. Therefore, the requirement that the "permittee requests modification. . . . within ninety (90) days after Federal Register notice of the action on which the request is based" is not applicable to this action.

In this case, EPA approved the site-specific criterion of 1500 mg/L when Arctic grayling are not spawning but has not taken action on the site-specific criterion of 500 mg/L which would apply when Arctic grayling are spawning. The final modified permit allows the facility to discharge during Arctic grayling spawning because the State's 401 certification states that the existing state-wide standard for TDS allows 500 mg/L TDS in Main Stem Red Dog Creek during Arctic grayling spawning.

Comment 8: DEC has proposed to authorize a mixing zone 1,930 feet long in Red Dog Creek but water quality monitoring will not occur until 6,300 feet downstream of the edge of the mixing zone. If the permit is modified EPA should require monitoring at the edge of the mixing zone to ensure that TDS levels at the edge of the mixing zone are the same as those nearly 5,000 feet downstream.

Response: The final permit modification has been revised to more fully address this concern. A mixing zone is an area in a waterbody downstream of a discharge where the effluent plume is diluted by the receiving water, and within which specified water quality criteria may be exceeded. The mixing zone in Main Stem Red Dog Creek ends where the creek turns approximately 90° at rock outcroppings that form small whirlpools that cause thorough mechanical mixing. Teck Cominco monitored conductivity across the width of Main Stem Red Dog Creek at 60 feet, 600 feet, 1260 feet, and 1560 feet downstream from the confluence of North Fork Red Dog Creek. These measurements confirmed that complete mix occurred at 1560 feet downstream of North Fork Red Dog Creek, where the creek turns 90°.

As stated in the Fact Sheet, a water quality monitoring station, Station 10, is located 1.2 miles (about 6,300 feet) below the confluence with North Fork Red Dog Creek. Since the effluent and receiving water are fully mixed at the edge of the mixing zone and there are no other tributaries to Main Stem Red Dog Creek between Station 10 and the edge of the mixing zone, it is reasonable to assume that the TDS concentration measured at Station 10 will adequately reflect the TDS concentration at the edge of the mixing zone. However, to confirm this assumption the final permit modification has been revised to require monitoring at the edge of the mixing zone in Main Stem Red Dog Creek, and at the edge of the mixing zone in Ikalukrok Creek.

Comments from the Center for Science and Public Participation:

Comment 9: Teck Cominco must focus on improving source control and effluent treatment systems by designing and implementing an effluent treatment and runoff collection system that generates high quality effluent that meets regulatory limits before it is released into the Red Dog Creek watershed.

Response: Neither the Clean Water Act nor the NPDES regulations give EPA the authority to dictate the type of treatment the permittee must use to comply with the effluent limits in its permit. However, Teck Cominco is undertaking several activities to reduce the concentration of TDS in the effluent, as outlined below.

Water Management and Selective Water Treatment

TDS in the effluent is composed primarily of calcium and sulfate. The calcium originated from lime used in the water treatment plant, which treats the tailings pond water by replacing dissolved metal ions with calcium ions. Tailings pond water containing high levels of zinc, lead and cadmium is mixed with lime (CaOH) in the water treatment plant, resulting in metal hydroxides that precipitate and are then removed from the solution. The TDS and sulfate concentration of the tailings pond water is approximately the same as the TDS and sulfate concentration of the effluent water. However, the metals that were in the tailings pond water have been removed in the treatment process and replaced with calcium.

A TDS load balance model established that the majority of TDS in the tailing pond comes from the mine sump (i.e., the area where mine drainage collected from the mine site is collected) and drainage from the mine waste rock dump. Bench scale testing in 2001 showed that by treating high TDS flows from the mine sump directly in the water treatment plant, the TDS load could be removed, before entering the tailings impoundment, by precipitating calcium sulfate solids with the metal hydroxides. By treating the water in this manner, a significant TDS load could be eliminated from the tailings impoundment. The effectiveness of this treatment will be continue to be evaluated. Additionally, the engineering parameters necessary to divert the main waste dump drainage into the water treatment plant will be evaluated in 2003.

When treating the mine sump and main waste rock dump drainage water directly the TDS load balance model indicates that the TDS concentration in the tailings impoundment may be reduced from 3600 mg/L to 2400 mg/L in approximately four years. Reducing the TDS load in the tailings impoundment will result in an equivalent reduction in the TDS load in the effluent.

TDS Source Control

A method to reduce the rate of metal sulfide oxidation in the waste rock pile, which would result in the reduction of the rate of TDS production, is being evaluated. Teck Cominco participated in an EPA-funded research project which tested the application of a proprietary compound on waste rock to attempt to eliminate the biologically catalyzed portion of the oxidation reaction. Tests conducted on-site with Red Dog waste rock resulted in the production of 50% less sulfate in the test plots versus the control plots. Teck Cominco has solicited a proposal from the laboratory conducting the tests to continue research on their product and the potential applications of the product at mine sites.

Water Management

Teck Cominco is continuing its effort to reduce the amount of clean water going into the tailings impoundment. Teck Cominco estimates that the current projects they are working on will reduce the volume of water that needs to be treated and discharged by over 60 million gallons per year.

Comment 10: Current treatment technologies at the mine must be assessed to assure efficient technology is used to meet water quality standards. Regulatory agencies have an obligation to require Teck Cominco to improve treatment systems at the mine to meet regulatory standards, instead of granting exemptions from the law.

Response: As stated previously, the NPDES regulations do not give EPA the authority to dictate the type of treatment the permittee must use to comply with the effluent limits in its permit. It is unclear what the commenter is referring to regarding "granting exemptions from the law."

Comment 11: Teck Cominco needs to supply the public with an analysis of the accuracy of their TDS model prediction and field confirmation of actual TDS concentrations in spawning areas.

Response: EPA agrees that this information would be helpful, therefore, the final permit modification requires Teck Cominco to compare their model prediction with the results of the ambient TDS monitoring.

Comment 12: In the past EPA, DEC, and Teck Cominco have relied on the Alaska Department of Fish and Game, Division of Habitat to conduct field studies

to determine when spawning was complete. Staff from the Division of Habitat responsible for conducting this research are no longer with ADF&G. EPA must require Teck Cominco to retain an independent third party to conduct the spawning survey each year because determining when spawning is complete is essential to protect fish species in the Red Dog Creek watershed.

Response: EPA has no basis for requiring Teck Cominco to hire an independent third party. However, the modified permit provides that Teck Cominco cannot begin discharging without written approval from EPA. Prior to giving approval, EPA will consult with the necessary State agencies, and Teck Cominco. It is in Teck Cominco's best interest to ensure that field studies to determine when spawning is complete are carried out by credible biologists.

Comment 13: EPA must establish and enforce a binding compliance agreement that details a penalty schedule for violations of NPDES permit requirements.

Response: The NPDES regulations do not give EPA the authority to incorporate a compliance agreement, or penalty schedule for potential violations, within an NPDES permit.

Comment 14: It is probable that mine activities are still negatively affecting chum salmon returns. EPA must require Teck Cominco to conduct field tests to fully determine the effects of mine discharges and other mine activities on aquatic organisms.

Response: It is not clear which mine activities the commenter is referring to, however, this permit modification is limited to issues related to TDS. Additionally, the current permit contains an extensive biomonitoring program that requires: monitoring of fisheries use in North Fork Red Dog Creek, Red Dog Creek, Anxiety Ridge and Ikalukrok Creek; fish tissue analysis of Dolly Varden; aerial surveys of Dolly Varden and chum salmon; benthic invertebrate monitoring; and periphyton monitoring.

CENTER ON RACE POVERTY AND THE ENVIRONMENT

Comment 15: In the ASTF report king, pink and coho salmon showed adverse effects during fertilization at TDS levels of 250 ppm during the continuous exposure assay (eggs were fertilized in the TDS solution for 2 minutes, rinsed, and then transferred to the same concentration of test solution for the remainder of the assay). Coho salmon exhibited effects at 250 ppm, pink salmon at 500 ppm, and king salmon at 750 ppm during the fertilization exposure assay (eggs were fertilized in the TDS solution for 2 minutes and then transferred to control water).

Response: See response to Comment #1.

Comment 16: The ASTF study showed that TDS had a statistically significant effect on average weight and average length of fish at 500, 750, and 1250 ppm.

Response: The ASTF study did show that average weight and length of fish were significantly affected at TDS levels as low as 500 ppm. However, the study also found that as these fish aged there was not a significant difference in average weight and height between fish in high TDS water as compared to fish in the control water.

Comment 17: The permit modification is not based on meeting the water quality criteria at the boundary of the mixing zone in Main Stem Red Dog Creek, but on meeting the criteria 4,370 feet downstream, at station 10. This is a violation of EPA guidance. There is no way for EPA to determine whether the TDS standard is being met within the mixing zone. EPA must either require testing at the edge of the mixing zone, or designate the entire 6,300 feet as a mixing zone.

Response: See response to Comment # 8.

Comment 18: Allowing Teck Cominco to discharge at 1500 mg/L at Station 10 in Main Stem Red Dog Creek means that spawning fish will be affected at downstream locations. Because of this impact the proposed standard must be rejected.

Response: The permit requires TDS concentrations to be at or below 500 mg/L at Station 160 (which is located in the Ikalukrok Creek, above the spawning area) from July 25th through the end of the discharge season. At times, the

TDS concentration at Station 10 may have to be less than 1500 in order to meet the more stringent requirements at Station 160. That more stringent requirement at Station 160 will protect the downstream spawning referenced in the comment.

Comment 19: The Alaska Fish and Game literature review may underestimate the impact of TDS on aquatic organisms because the water samples were filtered prior to being analyzed for TDS. The filtration may remove particulates that could contain constituents toxic to aquatic organisms. The effluent discharged by the facility is not filtered, and may contain particulates harmful to aquatic life. At a minimum, waters at Station 10 should be analyzed for Total Solids content, which would include TDS plus total suspended solids (TSS).

Response: The purpose of the literature review by the Alaska Department of Fish and Game was to determine the effects of total dissolved solids (TDS) on aquatic life. Particulates are not a constituent of dissolved solids so it would not make sense to include them in the measurement of dissolved solids. Furthermore, the permit already contains effluent limits for the known toxics in the effluent, and for whole effluent toxicity which is used to protect against the aggregate toxic effect of the pollutants in the effluent. The existing permit already requires Teck Cominco to monitor the effluent for TSS and the results of that monitoring show that there are very low TSS levels in the effluent. Additionally, the treated effluent is filtered through sand filters prior to being discharged to the waterbody. Finally, this permit modification is limited to issues that pertain to TDS. Particulates are not part of TDS, therefore, they are beyond the scope of this permit modification. The final permit modification will not require monitoring for TSS at Station 10.

Comment 20: Measuring TDS or total solids will reveal almost nothing about the actual or potential chemical toxicity of the discharged waters.

Response: The purpose of measuring TDS is to ensure that TDS is at concentrations that will not cause negative impacts on aquatic life. The existing permit already contains separate limits for other known toxics as well as whole effluent toxicity.

Comment 21: Because Teck Cominco has violated its permit there is no assurance that it will not violate the proposed limit.

Response: Compliance issues are outside the scope of the permit modification. There is no reason to believe that the modification will increase the likelihood of violations.

Comment 22: EPA should require more water quality protective treatment technology and include the technology as part of the NPDES permit renewal process in August 2003.

Response: See Comment # 10.

Comments from NANA Regional Corporation

Comment 23: The NANA Regional Corporation supports the proposed permit modification. Historically, NANA shareholders in the Red Dog region were aware of the toxic nature of Red Dog Creek and intentionally avoided them. Teck Cominco's effort to improve water quality at Red Dog has and will continue to improve the water quality of the Red Dog drainage.

Response: Comment noted.

Comments from Teck Cominco Alaska Incorporated

Comment 24: The site-specific criterion for the Main Stem Red Dog Creek allows up to 500 mg/L TDS in the receiving water, as measured at Station 10, from the initiation of discharge until Arctic grayling finish spawning. The draft permit does not allow discharge until Arctic grayling finish spawning, and neither the fact sheet nor the EA provides a justification for a more stringent limit than what is required by the site-specific criterion.

Response: EPA has not taken action on the site-specific criterion of 500 mg/L, therefore, it cannot be used when making Clean Water Act decisions. The "no discharge" requirement was included in the draft modified permit based on Teck Cominco's January 9, 2002, request to DEC for site-

specific criteria, and authorization for mixing zones. Teck Cominco's request stated that the site-specific criterion of 500 mg/L would apply during Arctic grayling spawning in Main Stem Red Dog Creek, and that the mixing zone in Main Stem Red Dog Creek would not apply during Arctic grayling spawning. Without a mixing zone, Teck Cominco could not meet the site-specific criterion of 500 mg/L.

DEC did not indicate, prior to EPA's issuance of the draft permit modification, that its 401 certification would contain a mixing zone other than what Teck Cominco requested, therefore, the draft modified permit imposed a "no discharge" limitation. The final modified permit has been revised based on the State's final 401 certification, which allowed a mixing zone in Main Stem Red Dog Creek during Arctic grayling spawning. See response to Comment # 2 for additional information.

Comment 25: The draft modified permit requires written approval from EPA prior to initiation of discharge from Outfall 001. In the past the State was consulted prior to discharge since they generally have regulatory personnel on site during spawning season. Requiring written approval from EPA prior to discharge will result in delaying the initiation of discharge.

Response: In the past EPA has relied on the ADF&G to conduct field studies to determine when spawning was complete. Staff responsible for conducting this research are no longer with ADF&G and it is not clear if a high priority will be given by State to monitor Arctic grayling spawning. Because of these uncertainties written approval from EPA will be required before the mine can begin discharging (also, see response to Comment #12).

Comment 26: Part I.8.b. implies that the TDS concentration should be controlled. Since the Teck Cominco cannot control the concentration of TDS discharged Teck Cominco requests this section be reworded to state ". . . .the permittee shall limit the TDS load discharged. . . ."

Response: The final permit modification has been revised to include the above language.

Comment 27: Should effluent sampling for TDS be grab or composite?

Response: The effluent sampling for TDS should be a grab sample (as stated in I.8.c. of the modified permit).

Comment 28: Part I.8.d. requires updating the TDS/conductivity correlation monthly. Currently, the correlation curve for station 10 is based on 80 samples, and the correlation curve for station 160 is based on 70 samples. Four data points collected in one month will not affect the correlation curve. We suggest updating the correlation curves once in the middle of the discharge season using the data collected up to that point, and once in the spring prior to initiating discharge using all of the data collected the previous discharge season.

Response: The final permit modification has been revised to require the permittee to update the TDS/conductivity correlation curve twice each year.

Comment 29: The draft modified permit requires monthly analysis of carbonates, chlorides, sulfates, potassium, magnesium, calcium, and sodium. Teck Cominco would like clarification on what carbonate analysis is. Teck Cominco analyzes for alkalinity and estimates carbonates based on pH.

Response: Teck Cominco can estimate carbonates based on alkalinity. The final permit modification has been revised to allow the estimate of carbonates based on measured alkalinity.

Comment 30: Teck Cominco notes that TDS is the regulated parameter and that analysis of carbonates, chlorides, sulfates, potassium, magnesium, calcium, and sodium have no bearing on compliance. Additionally, Teck Cominco would prefer to monitor for these constituents voluntarily to avoid unnecessary potential monitoring violations should weather conditions or other factors not allow for collection or analysis of samples.

Response: EPA recognizes that Teck Cominco has been gathering this information voluntarily. However, it is possible that priorities at the facility could change, and monitoring of these constituents may not continue. It is important to continue gathering this information since the site-specific criterion is directly related to the ionic composition of TDS. To ensure this data continues to be collected it has been made a requirement of the

final permit modification. The permittee is not required to gather this information under any type of hazardous condition.

Comment 31: Part I.8.f. states that flow volumes must be recorded from Outfall 001, however it is not clear from which station(s) the allowable flow volume is calculated from. It should be made clear that these calculations are not required for Station 150, and are only applicable at Station 160 during the salmon spawning season.

Response: Part I.8.f. of the permit clearly states which stations need to be monitored in order to calculate the allowable flow volume from Outfall 001. It is not necessary to also state that Station 150 is not included. Additionally, this part of the permit also states: "The calculations and data for Station 160 shall be made and recorded when the TDS limit for Station 160 is in effect." Part I.8.b. of the permit states when the TDS limit for Station 160 is in effect, therefore, it is not necessary to repeat this information in the permit.

Comment 32: The second to the last sentence in Part I.8.f. is confusing. The wording should be changed to reflect that when there are TDS limits at Station 160, the allowable effluent flow must be calculated for both Station 10 and 160 using measurements collected within a reasonably concurrent time frame at each stream station.

Response: In order to make an accurate comparison, it is important that the stream conditions at Stations 10 and 160 reflect the same point in time. It is not clear what Teck Cominco considers a reasonably concurrent time frame. However, since the data loggers collect information every 30 seconds, it seems reasonable that the time difference between the data collected at Station 10 and station 160 should not exceed 30 minutes. This has been incorporated into the final permit modification.

Comment 33: In section I.8.f. under the heading "Effluent," it requires TDS to be calculated based on the measured conductivity of the effluent. The effluent TDS concentration is used in the mass balance equation to predict the magnitude of an effluent flow adjustment. In the 2002 Compliance Order this requirement was changed to require a fixed effluent TDS level to be used because the effluent TDS concentration is relatively constant and

there is a relatively poor correlation between effluent TDS and effluent conductivity. A conservative value of effluent TDS could be selected for the remainder of the permit cycle, or the TDS value could be updated periodically or as needed. By setting a conservative fixed effluent TDS concentration, the allowable flow calculation will tend to slightly under predict how much of a flow increase the mass balance equation predicts is possible.

Response: The final permit modification has been revised to set a conservative fixed value of 3900 mg/L for TDS. The effluent discharged from Outfall 001 must not exceed this concentration, and this concentration must be used to calculate the allowable discharge flow.

Comment 34: Teck Cominco suggests that the equation:

$$Q_{adj} = Q_E + \frac{(Q_{Sta}(C_{limit} - C_{Sta}))}{(C_E - C_{limit})}$$

be the only equation in the permit for the following reasons:

1. Derivation of the equation should be in the Fact Sheet similar to water quality based effluent limits calculations.
2. The equations in the current permit are confusing and bulky.
3. The existing language could be interpreted to require the permittee to report the results of intermediate calculations that are confusing and have no relevance.
4. Stating the above equation provides more flexibility if the 500 mg/L limit at Station 10 during Arctic grayling spawning is allowed.

Response: In general, a water quality based effluent limit is derived in the Fact Sheet for a permit. In those cases, a monthly average and maximum daily limit is calculated and is applicable throughout the life of the permit. In this case, the water quality based effluent limit changes daily based on the results of the mass balance equation. It is important that EPA be able to verify the results of the calculations, therefore, the permittee must submit all the measurements and calculations with the monthly discharge monitoring report (DMR). The final permit modification contains this requirement.

Alaska Miners Association, Inc.

Comment 35: The Association supports the permit modification.

Response: Comment noted.